

Summary

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Methodological News contains articles on a range of topics across different areas within the Methodology Division in the ABS. This issue contains three articles:

- An ABS Perspective on Safe Data Access
- Firm-level Capital Stock and Multifactor Productivity Calculation
- Using SUTSE Models to Measure Statistical Impact for the Job Vacancies Survey

An ABS Perspective on Safe Data Access

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Data access is becoming an increasingly important topic in the modern data landscape. This is due to increasing recognition of the value in data for areas such as scientific research, policy-making and business decision-making. This has been catalysed by the ever-increasing computing power and improved methodologies that enable more powerful data analyses. The fundamental challenge with data access is how to allow it in a safe way – managing privacy and confidentiality risks while maximising the utility of the data. On one extreme, preventing data access altogether would ensure minimal risk, but could render the data almost useless to anyone who does not have access to it. On the other extreme, allowing data access without any protective measures in place would enable the data to be used freely, but not all of those uses may be desirable and could heighten privacy and confidentiality risks. Data custodians enabling data access almost always seek a middle ground between these two extremes, dubbing this as the 'utility-risk trade-off'.

The literature on the topic of safe data access is rich and growing, with contributions from fields such as statistics, computer science, data science, economics and even psychology. The ABS hopes to contribute by sharing our knowledge and experience in the form of a research paper, which we aim to release in early 2020. The paper will:

- highlight some of the main considerations and challenges in enabling access to public sector data,
- outline our definitions of privacy, confidentiality and data utility,
- provide an overview of our data confidentiality processes through the lens of the Five Safes Framework,
- compare and discuss our approach against other approaches, and
- explain the need to consider the utility-risk trade-off under different contexts.

The Five Safes Framework is the core of ABS' confidentiality processes and is also adopted by the UK Office for National Statistics and Statistics New Zealand. This framework considers disclosure risk holistically through five dimensions:

- Safe Projects: Is the data to be used for an appropriate purpose?
- Safe People: Is the researcher appropriately authorised to access and use the data?
- Safe Settings: Does the access environment prevent unauthorised use?
- Safe Data: Has appropriate and sufficient protection been applied to the data?
- Safe Outputs: Are the statistical results non-disclosive?

The ABS has always been investing resources into research and development of methods for enabling safe data access. As the environment evolves and new ideas emerge, the ABS will continue to remain at the forefront of the debate as a thought leader and key contributor.

For more information, please contact Edwin Lu Methodology@abs.gov.au

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Firm-level Capital Stock and Multifactor Productivity Calculation

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The Methodology Division of the Australian Bureau of Statistics, in partnership with the Centre for Applied Economics Research of the University of New South Wales, has undertaken research to develop experimental estimates of firm-level capital stock and to apply a method for the estimation of firm-level multifactor productivity (MFP) using integrated microdata from the Business Longitudinal Analysis Data Environment (BLADE).

The study tested a number of methods to derive estimates of firm-level capital stock using the BLADE data. Amongst the methods tested, the Perpetual Inventory Model (PIM) stood out as the most feasible to apply. PIM made use of data from the Business Activity Statement (BAS) and Business Income Tax (BIT) to derive a flow of firm capital stock. PIM is highly dependent on estimates of depreciation rate and initial capital stock. PIM applications usually differ in the assumptions they make for these two components.

The study made use of the capital stock estimates to calculate firm-level MFP. In calculating firm-level MFP, academics and researchers from national statistical organisations use various methods, which can be grouped into parametric modelling (e.g. stochastic frontier analysis, regression analysis) or non-parametric methods (e.g. index number, data envelopment analysis). In the study, the Tornqvist index is utilised to produce the experimental measure of firm-level MFP.

Preliminary results demonstrate that BLADE can be a useful statistical asset for calculating and analysing firm-level capital stock and firm-level productivity. Though exploratory and experimental in nature, these firm-level measures can help facilitate analysis of the micro drivers of productivity growth as well as provide useful insights on many productivity-related dynamics.

For more information or to provide feedback, please contact Franklin Soriano Methodology@abs.gov.au

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Using SUTSE Models to Measure Statistical Impact for the Job Vacancies Survey

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As an important element of the ABS transformation program, best practice guidelines for Statistical Impact Measurement (SIM) have been developed by Methodology Division. One aspect of SIM is the use of state space models to measure and manage statistical impact on time series. The ABS has previously communicated on the use of state space models for measuring statistical impacts. In preparation for onboarding to new data acquisition functionality, state space models in the form of Seemingly Unrelated Time Series Equations (SUTSE) were developed for the Job Vacancies Survey (JVS). The use of SUTSE models for the JVS was possible because it is one of the few collections that have a related time series (the ANZ Job Ads Series) that can be used to improve the predictive power of the SIM model to detect a possible impact.

Several SUTSE models were developed for SIM in JVS, with the bivariate SUTSE model incorporating an estimated trend relationship between JVS and the ANZ series, as well as an estimated relationship between the irregular/noise components of the two series, being developed as the main SIM model for JVS. Additionally, two other SUTSE models were also developed for comparison purposes. The first alternative model incorporates only an estimated trend relationship between the JVS and ANZ series with no estimated relationship for the irregular/noise components, while the second alternative model assumes no estimated relationship for neither the trend nor the irregular components. The models were applied on the assumption that the impact was to be a level shift in the time series.

With all of the three models, the Minimum Detectable Impact (MDI) indicator is used to decide whether the impact is deemed statistically significant by the model with specified significance level and power. For the JVS SUTSE model, it was set to detect a 5% level shift in the JVS series (which is about one published standard error) in the first quarter after transition with power of 50%, and a 10% level shift (which is about two published standard errors) in the first quarter after transition with power close to 98%.

The SUTSE models have been applied to measure the statistical impact on the JVS time series for both the May and August 2019 cycles (the first two cycles for the collection under new data acquisition functions). In addition to the SUTSE models, regular time series diagnostics including Regression ARIMA forecasts were applied to assess whether a statistical impact was present in the JVS time series. The results from both cycles have indicated no statistically significant impact on the JVS series from the transformation process. The application of the models have been valuable for adding an extra layer of quality assurance to the JVS data during the transitioning period. Looking forward, it is envisaged that these models will be re-deployed in future JVS cycles where significant changes are introduced to the survey, for example when a new sample design is introduced. These models also have potential to be used as a regular data confrontation tool during the quality assurance phase of each cycle.

For more information, please contact Lyndon Ang Methodology@abs.gov.au

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Methodological News features articles and developments in relation to methodology work done within the ABS Methodology Division. By its nature, the work of the division brings it into contact with virtually every other area of the ABS. Because of this, the newsletter is a way of letting all areas of the ABS know of some of the issues we are working on and help information flow. We hope the Methodological Newsletter is useful and we welcome comments.

If you would like to be added to or removed from our electronic mailing list, please contact:

Methodological News Editor
Methodology Division
Australian Bureau of Statistics
Locked Bag No. 10
Belconnen ACT 2617

Email: methodology@abs.gov.au

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About this Release

Methodological News is a quarterly information bulletin from the Methodology Division. The newsletter features articles and developments in relation to work done with the division.

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